

CLEFT PALATE,

WITH

CASES IN ILLUSTRATION OF ITS SUCCESSFUL TREATMENT.

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THE principal object of the present communication is to bring forward some cases of cleft palate in illustration of an improved method of treatment furnished by modern surgery, the advantages of which, though well established in the minds of those who have yielded it a thorough investigation, is still questioned by many surgeons of eminence as operators who have hitherto been in the habit of practising the old operation. This treatment differs widely in principle from the more usual method; and it becomes an important subject for consideration, as to how far the more recent operation is entitled to the improvement which is claimed for it,—the disadvantages of the old proceeding, the advantages of the new one.

Before, however, entering into the relative merits of the two operations, a few remarks upon the peculiar structure and function of the parts concerned may not be deemed misplaced; though it will not be necessary to describe these in detail, but only to make reference to certain points bearing upon the operations in question.

The *velum pendulum palati* consists of muscular and glandular structure, enclosed in mucous membrane, and is a continuation of the palate posteriorly into a moveable flap, with an inclination downwards and backwards: it constitutes a valve at a point where two passages meet, and is adequate to the closure of either of these for the temporary advantage of the other.

Its muscular portion forms a layer on its postero-superior surface, which is firmly attached by tendinous and muscular fibres to the horizontal plates of the palate bones, and by muscular alone to the sides of the pharynx; by mingling with the superior constrictor, each side is also connected with the internal pterygoid plate and hamular process of the sphenoid bone. It is covered by a thin mucous membrane, having numerous subjacent glands.

The glandular portion is continuous with that covering the hard palate: it consists of firm but coarse glandular structure, intersected by fibrous septa, and contains an abundance of very tenacious mucus; anteriorly, and on each side, it forms about two thirds of the whole thickness of the velum, diminishing, however, towards the middle (producing a concavity corresponding to the vault of the palate), and from before backwards towards its free border: it is covered by a thick and dense mucous membrane.

The muscles consist of five pairs, of which one is united in the middle line, forming the *azygos uvulæ*; they differ materially in size, and are of so complex an arrangement that their action is not very obvious.

The *levator palati* has a direction downwards, inwards, and forwards, and is of equal size, and muscular throughout. Each muscle spreads out at its inferior attachment, and is inserted into the middle of the *velum palati*, with the

substance of which it blends; but it is more immediately connected at its insertion with the palato-pharyngeus, the principal part of which usually runs beneath it. The two muscles are separated below by the azygos uvulae, beneath which some of their fibres unite in the middle line. Extending round its under and posterior surface is the concave upper margin of the superior constrictor; this consists of a thick bundle of muscular fibres, which pass from their attachment to the lower third of the internal pterygoid plate and hamular process of the sphenoid bone,—at first, almost directly backwards, where they join with the fibres of the palato-pharyngeus; they then curve inwards, and, ascending to the mesial line, are prolonged by aponeurosis to the basilar process of the occipital bone.

The *circumflexus* or *tensor palati* becomes tendinous before turning round the hamular process of the sphenoid bone, and is here provided with a beautiful synovial capsule, which would appear to be associated more with the sharp turn made by the tendon, than as indicating much movement at this part: having passed this, it immediately radiates into a fibrous expansion, situated horizontally, and is attached to the transverse ridge on the horizontal plate of the palate-bone, to the extremity of the alveolar arch of the superior maxilla, and also to the muscle of the opposite side, beneath the azygos uvulae. This fibrous expansion, by its density, serves as a point of union for the other muscles of the soft palate, gives firmness to the latter, more especially near its bony attachment, and prevents the sudden transition from bone to muscle which would otherwise take place at this part; it also enables the velum to maintain its ordinary oblique position midway between that which it is made to assume during mastication and deglutition.

The *palato-pharyngeus* ascends behind the tonsil from the thyroid cartilage and side of the pharynx, and divides into two portions: of these, by far the larger passes upwards with an inclination forwards and inwards beneath the levator, to the under surface of the circumflexus palati, in which they terminate, or are prolonged to the hard palate; the other division consists of a small band of muscular fibres, running more transversely, and forms the free margin of the palate. Some fibres intermediate between these two portions interlace with the insertion

of the levator palati. The first or longitudinal portion is situated, for the most part, between the levator and tensor palati muscles, and blends, on its outer surface, with the pterygoid extremity of the upper concave margin of the superior constrictor, the union of the two forming a muscular bundle of considerable size. Occasionally a portion of the palato-pharyngeus passes vertically behind the levator palati to the side of the eustachian tube, and has been named *salpingo-pharyngeus*.

The *palato-glossus* is the smallest muscle of the palate, and forms an arch, with the convexity outwards, immediately in front of the tonsil. It radiates at its palatal attachment; the middle fibres becoming somewhat tendinous, unite with those of the opposite side; those near the free border of the palate run with the transverse slip of the palato-pharyngeus, while those in front pass into the tendinous expansion of the circumflexus palati. The fibres passing to the middle line, in conjunction with the longitudinal portion of the palato-pharyngeus, with which they interlace, receive the insertion of the levator palati of the same side by intermingling of fibres, and by this means these muscles can act antagonistically.

The *azygos uvulae* extends from a fibrous expansion in connection with the spine of the palate bones along the superior surface of the raphe, and terminates in the uvula.

From this rough sketch it may be perceived that the lateral connections of the velum palati are almost entirely muscular; and this is important in relation to the susceptibility of the flaps, in cases of fissure of the palate, to participate in the general movements of the pharynx, and also as affording an adequate explanation of the width of the cleft, produced, in the majority of instances, not by an absence of tissue, but by the tonic action of muscles unopposed by their proper antagonists.

It should be observed here, as bearing upon the subject (since the circumflexus palati has been held out as the muscle having more influence in the production of tension of the flaps, after their union by suture, than the other muscles of the palate), that a large proportion of the aponeurotic fibres of this muscle are inserted into bone, leaving but a small portion which could possibly be concerned in producing tension, and that

portion miscalculated to do so, from its intimate connection with the denser part in front having a bony attachment. Moreover, this muscle is confined to the anterior half of the velum, where the fissure of the palato is narrowest. What, then, is the cause of the separation of the posterior part? The answer to this may easily be found in the obvious action of the levator palati muscle and pillars of the fauces. There is some difficulty in closing the fissure in front in most cases, attributable to the greater density of the parts there, and their peculiar position in relation to the bony structures, and, possibly, slightly to the action of the circumflexus palati.

The principal action of the circumflexus palati is to give *firmness* to the velum, especially near the base, during the action of its other muscles; but, doubtless, all the palatal muscles are concerned, more or less, in the production of each of the varied movements of the soft palate.

The movements of the pharynx appear to have been but little understood till a very recent period; accordingly, we find, in Mr. Lawrence's work upon the Pharynx, published in 1834, the following passage relating to the closure of the upper part of the pharynx from communication with the nose, as in swallowing.

"At the time that the elevation and retraction of the tongue urges the morsel of aliment into the pharynx, the velum palati is drawn up against the choanæ narium.*"

The closure of the pharynx superiorly, occurring during deglutition, is produced by slight elevation of the soft palate, so as to bring the upper and posterior surface of its free margin against the back of the pharynx; and any person may do this at will by exhaling air through the nose audibly, and a perfectly isolated jets, while the mouth is closed: the period immediately preceding each gush of air marks the contact of the soft palate with the pharynx.

This movement of the velum is probably effected by the combined action of the levator-palati and palato-pharyngeus of each side, assisted by the pterygoid muscles. The lateral curved fibres of the superior constrictor approach it

on either side, and its firmness is attained by traction of each tensor palati muscle.

The closure of the fauces at the same period is effected partly by the action of the pillars of the fauces, which constrict it, but more especially by the elevation of the base of the tongue, which is kept in contact with the roof of the mouth by means of its proper muscles, assisted by the mylo-hyoidei.

The soft palate and upper part of the pharynx are so near each other in the natural state, that they are brought into close apposition by a very limited movement of the velum and sides of the latter; the kind of closure resembling a valve opening downwards.

The proximity of the pharynx to the posterior nares may be seen from the position of its aponeurotic attachment to the base of the skull, which corresponds to a part but little behind the free margin of the hard palate; and hence the posterior wall of the pharynx is easily within the range of the movements of the velum.

This point has been adverted to more particularly, since the closure of the upper part of the pharynx from communication with the nose is described by some anatomists of the present day as effected by an elevation of the soft palate, the superior constrictor coming forward at the same time to meet it.

A little reflection on the relation of the parts will show that the constrictor does not come forward, but that (having a fixed position behind) the narrowing of the cavity which it encircles is obtained by approximation of its lateral walls, much in the same way; the position only being changed, that the lateral fibres of the diaphragm descend without movement of its tendinous centre.

The following reasons may be assigned for this opinion:—The natural relations of the parts are such as to be efficient without such movement. The nature of the attachment of the upper part of the pharynx in the middle line to the parts against which it rests, and the improbability of the space which would thus be left behind, between it and the cervical spine, being filled by other structures.

In deglutition, the pressure of the tongue against the roof of the mouth, effected by its proper muscles and the mylo-hyoidei, is resisted by the tensores

* * Anatomico-Chirurgical Views on the Nose, Mouth, Larynx, and Fauces.

palati and pillars of the fauces. The levatores palati, from their connection, by intermingling of fibres with the latter, as before described, allows them to act from their palatal attachment, so as to constrict the fauces, without the velum being drawn down.

I apprehend that, in the various movements of the soft palate associated with deglutition and respiration, the elevators and depressors of the velum sometimes act as antagonists, both sets contracting simultaneously, as in closure of the fauces; at other times one set contracts, and effects movement at its attached part by virtue of a permissive action of the other set, and that, by different combinations of these movements, the function of the part is discharged. In this respect these do not differ from more strictly voluntary muscles. From the relative position of the muscles of the soft palate, it will be observed that the levator-palati and palato-pharyngeus of each side being antagonists to each other and to those of the opposite side, and acting coincidently, when the union in the middle line of the palate is interfered with by congenital fissure, the combined action of the two on either side will be to draw the flaps asunder. It may be asked—how is this action compatible with the approximation of the edges of a cleft palate during attempts to swallow?

The only explanation of this action of which I am aware is given by Prof. Fergusson, who stated, in his valuable paper on Cleft Palate, that the edges are pushed together by the superior constrictor and upper part of the middle one. There appears but little evidence in support of this explanation; but, if attention be directed to the kind of curve the lateral fibres of the constrictor make round the side of the velum, it will be perceived that, when the muscle acts, the force produced is directed from without inwards and forwards; and hence it is not unreasonable to suppose that the same action which, in the normal state of things, effects the close approximation of the sides of the pharynx and velum, may, when there is cleft palate, and the muscles are put into inordinate action, as in the experiment alluded to, materially assist in bringing the flaps together.

Prof. Fergusson has alluded in his able paper upon the subject to some differences between the anatomy of the

parts in their natural and in their cleft condition, and has in his possession, which through his kindness I had an opportunity of examining, the dissection of a cleft palate taken from an aged subject: from this dissection he has observed that "the palato-pharyngei muscles are not attached to each other as in the well-formed palate; these muscles are seen to form the principal part of the free margin of the palate, along the line of fissure: their course is somewhat semi-circular from their upper to their lower end, the convexity being towards the middle line; and it follows that during action, if not opposed in any way, they must pull the parts outwards."*

I have recently had an opportunity of dissecting, in conjunction with Mr. Savory, the palate of a child two days old, the subject of cleft palate and hare-lip, which may be interesting in connection with the specimen above alluded to, and from which it differs somewhat. The dissection is in the museum of St. Bartholomew's Hospital.† It will be observed that the palatal muscles are remarkably well-marked at this early age, and in no respect differ from the same in their normal condition, as regards relative position, further than in their want of union in the mesial line.

The right flap is the larger of the two, and has a broader bony attachment: the fissure, which is wide, extends through the hard palate, implicating the alveolar margin in front, and laying open the nasal cavity to the left of the septum: a vertical section has been made of the tongue and larynx, and the muscles of the right side dissected.

The levator palati takes its usual direction from the base of the skull, in connection with the cartilaginous part of the eustachian tube, to the middle of the velum, where it spreads out immediately outside the azygos uvulæ. The palato-pharyngeus spreads out at its upper part: one slip forms the free margin of the soft palate, running to the base of the uvulæ; the next fibres mingle more or less with the levator palati, but the larger portion of the muscle pursues a course outside and below the insertion of that muscle, in

* Medical Times, March 6th, 1847.

† Malformations. Series A, 10 a.

the direction of the fibrous expansion of the tensor palati.

The palato-glossus is well marked, and as regards relative size is somewhat larger than in the adult. The fleshy portion of the tensor palati is large, but owing to the imperfect development of the pterygoid plates it is very short, and its tendinous expansion has not acquired sufficient denseness to be recognised as such. The azygos uvulæ is of considerable size, and each half occupies a free margin of the fissure.

Case of Cleft Palate successfully operated on according to Professor Fergusson's method.

Mary Derry, æt. 20, a healthy-looking girl, was admitted into the Royal Free Hospital, under the care of Mr. Gay, for a congenital fissure of the velum palati, which she was anxious to have operated upon. The pharynx was quite healthy, and the fissure, which was situated in the mesial line, extended quite through the soft palate, but did not implicate apparently the bony structures, and divided the uvula into two equal portions: each flap was of firm consistence, and sufficiently moveable and abundant to admit of the edges coming nearly in apposition mesially, during forcible deglutition: this movement, which has been alluded to before, may be easily seen while the patient attempts to swallow a small quantity of fluid with the mouth open, but requires a little practice to enable it to be done easily.

On irritating the flaps by means of a pointed instrument, each was drawn upwards and outwards, as it were spasmodically, so as to be almost buried in the sides of the pharynx. Her mouth was rather small; but, on the other hand, the great patience and determination that she manifested, together with the healthy state of the flaps and pharynx, rendered it a favourable case for operation. She stated that none of her relatives were remembered to have had a similar affection, and her mother attributed it to having seen a child with cleft palate during her pregnancy; that she had never been able to swallow fluids without a portion passing into the nose, but that by throwing her head back she was enabled to prevent its escape externally: her speech was unusually indistinct for a cleft of the soft

palate only, and she complained of deafness.

The girl being in good health and spirits, the operation for its cure was performed by Mr. Gay, after Professor Fergusson's method, in the presence of Mr. Wakley, Mr. Henry Smith, and others. After section of the levator palati of one side, the corresponding flap became incapable of being drawn up in the spasmodic way before alluded to upon irritation with a pointed instrument, and presented a strong contrast to that of the opposite side when similarly irritated; and after division of both levator palati muscles, the flaps were observed to have fallen towards each other, so that the cleft was reduced to about half its former size; the incisions were made freely, and the flaps were rendered by them loose and flaccid, and they could now be easily brought together without producing any tension: it was therefore deemed unnecessary to divide any other muscles. The flaps were then dissected from the hard palate for a short distance in front of the cleft, to facilitate the closure of the parts at the angle of the fissure. The margins of the flaps were freely pared, and brought together by five sutures, according to Prof. Fergusson's method, a detailed account of which will be found in his papers on the subject. The introduction of the sutures was found to be the most difficult part of the operation; they were tied, in order, from before backwards, those parts being closed first where there was most difficulty in their approximation. The bleeding, which was very trifling, was easily arrested by gargling with iced water previous to tying the sutures.

During the operation the patient remained tranquil, and appeared to suffer no particular pain; but the continued efforts to repress coughing, while the irritation of the fauces was going on, together with her restrained position, produced slight faintness, which, however, passed off quickly.

She slept well during the following night, and the next morning felt only slight sore throat,—no more inflammation followed than was necessary for the union of the parts; the stitches were removed four days after the operation, and union was found to have taken place throughout, except the halves of the uvula, and a small piece adjoining the hard palate. The latter afterwards

closed rapidly by granulations. From the first she was allowed to take nutrient fluids in small quantities and at frequent intervals, and after the 10th day could take ordinary diet.

Three weeks after the operation the palate was quite united throughout; she could swallow without difficulty, and her hearing was good; her voice appeared to have undergone little alteration, though occasionally she pronounced words on making the attempt without the disagreeable accent peculiar to these cases; showing that she was not prevented articulating correctly by structural deformity, but did so merely from habit, and only required continued and persevering efforts to overcome this in great measure.*

The concomitant deafness which occurs in these cases, is attributed by M. Delcaut† to a dryness and almost always a chronic irritation of the mucous membrane of the throat, in consequence of its exposure to the contact of the cold atmospheric air, which chronic inflammation extends to the middle ear, while Dieffenbach attributes it, with greater justice, to the closure of the eustachian tube. That the latter is the more probable explanation is inferred from the rapidity with which the hearing was restored in this case, as in others, after the operation.

The improvement in articulation which patients experience after closure of the fissure, is not so immediate as the greater ease of swallowing, and never is so considerable as might, *à priori*, be anticipated: this is principally owing, I believe, to a want of perseverance on the part of the patient, in learning an entirely new method of pronunciation, which is attempted under great disadvantages from his having been so long habituated to the movements of articulation associated with cleft palate, and the necessity of delaying the operation till about the time of puberty.

An operation, widely different to the foregoing, and which for the sake of

distinction I call the old operation, has been recently performed by Mr. Skey, in St. Bartholomew's Hospital, upon Eliza Smith, æt. 23 years. She is a stout and healthy-looking woman, who had a congenital cleft palate, implicating to a very slight extent the palate bones. The margins of the cleft were about an inch in length exclusive of the uvula, which was divided in the centre; the left flap was not quite so prominent as the right, and the corresponding margin of the fissure was a little longer. On making forcible attempts at deglutition the halves of the uvula came together, as seen by looking into the mouth. She stated, that to prevent fluids passing through the nose while swallowing, she had always been obliged to hold the head back; that her speech, which was considerably affected, had not undergone any improvement, and in her opinion was worse than when she was younger.

After waiting such a time from her admission as was deemed advisable, Mr. Skey pared the edges of the fissure with a small scalpel in the usual way, removing just enough mucous membrane to expose the thickness of the velum at its margin. A small incision was then made from the anterior extremity of the fissure directly forwards in the middle line: after this a lancet-pointed knife was passed into the velum on its under surface, and a deep incision made, commencing near the anterior extremity of the fissure midway between the cleft and the alveolar border, backwards and outwards parallel with the margin of the cleft for nearly an inch and a half, and terminating external to the uvula. This was repeated on the other side, and the flaps were then partially detached from the bones both from the cleft and the longitudinal incisions, after which, a sufficient interval having been observed, five sutures were introduced by means of small curved needles held in convenient forceps, the same thread being passed through both flaps. The posterior sutures were tied first, the parts coming together easily, but in tying those in front there was slight difficulty experienced in drawing the parts together, it being necessary to hold the first turn of the thread by means of long forceps while the knot was being completed; and while tying these, the longitudinal incisions began to gape, but only at their

* I have recently seen this patient, and find the improvement in her pronunciation is great: it is twelve months since the operation, and during that period she has devoted herself to acquiring more correct articulation, a social position of importance to her depending on the result: she has succeeded beyond her expectations, and has obtained the end in view.

† Recherche Pratique sur les Maladies de l'Oreille.

anterior half: it was deemed necessary before tying the last sutures to separate the soft parts from the palate bones a little more extensively. After the closure of the cleft the anterior pillar of the fauces on the right side being tight, it was divided with a scalpel, and the part seemed considerably relieved by the incision. The operation continued a little more than an hour, and did great credit to the well-known skill of the operator, though the progress of the case is, I fear, at present very unfavourable, and scarcely promises union of any part.

From the earliest period when an operation for uniting cleft palato was resorted to, up to the time when Prof. Fergusson's paper was published in 1844, but little improvement of this troublesome affection had been suggested, beyond various collateral incisions into the neighbouring soft parts, as practised by Dieffenbach, Roux, and others, for the purpose of preventing, or relieving, the tension of the flaps which occurs when they are brought together by sutures. In that paper he described an entirely new method of operating, the principle of which had been suggested to his mind during a careful study of the anatomy and physiology of the soft palate, both in its natural and in its cleft condition. From these investigations he discovered that the action of the muscles of the palate was a serious obstacle to the success of the operation of staphyloraphy as previously practised. He therefore proposed "that the surgeon should, on strictly scientific principles of myotomy, so conduct his incisions as to destroy all motory power in the soft palate, for the time being, and thus permit that repose of the stretched velum so essential to a happy result."*

This improvement in the operation was the more necessary, as its complete failure, owing to some cause or other, had been of no uncommon occurrence, even in the hands of skillful men; and, consequently, the operation was frequently declined, on the ground of its doubtful result and the difficulty of performing it. The afflicted applicant was thus compelled to continue in the same state, unfit for society, and unable to swallow his daily food with comfort.

The conclusions which Mr. Fergusson arrived at were:—

1. That the flaps are drawn upwards and to the sides when the levator palati muscles contract.

2. That, when the levator palati and palato-pharyngeus act strongly together, the flaps are so forcibly drawn from the mesial gap that they can scarcely be distinguished from the sides of the pharynx.

3. That the parts are forced together when the superior constrictor contracts during the act of deglutition.

4. That the circumflexus-palati possesses but a feeble action over the flaps.

The principle of this operation is to divide those muscles of the palate which have the power of drawing the flaps from each other, in order that the parts may be placed in a state of repose, and the joined edges of the cleft may not be pulled asunder by any convulsive action of these muscles during the process of union; the muscular wounds healing simultaneously with the fissured velum. The course adopted by Mr. Fergusson is obviously a right one; and, were the same system pursued in the investigation of truth in all instances, I apprehend more satisfactory results would be obtained. The direction given to surgical treatment suggested by an accurate knowledge of the anatomy and physiology of the parts concerned, is one of the greatest improvements of modern practice.

In considering the relative merits of the two operations, great disadvantage is experienced in our being unable to call in correct statistical reports of cases. Such reports cannot be advantageously adduced for or against either proceeding, in consequence of their not furnishing an accurate account as to how many times the operation of staphyloraphy has been performed. As regards the experience of the eminent surgeons of this metropolis, who have devoted some time and attention to this subject, each method has proved successful, with rare exceptions, in their respective hands.

Cases in which the new proceeding has been deemed inadvisable have succeeded under the old operation.* On the other hand, cases which have failed, more than once, under the old proceed-

* Medico-Chirurgical Transactions, vol. xxviii.

* A case of this kind has been mentioned to me by my friend Mr. Savory.

ing, have succeeded entirely on the first trial of the new method. Of these may be mentioned Mr. Tuson's case, in which three previous operations had failed, and Mr. Bowman's case, in which he operated first according to the old plan, but unsuccessfully; and subsequently, on performing Prof. Ferguson's operation on the same patient, he succeeded.*

From many cases that have come to my knowledge, I presume that the operation for cleft palate, as usually performed, is frequently unsuccessful, and that it is among those operations in surgery which are least certain in their results. Its unfavourable issue is not so frequently owing to an unskilful performance of the operation, as to a non-appreciation of the causes usually interfering with the healing of the parts, and the consequent inability of the operator to effect their removal, so as to place the flaps in a favourable position for their union when brought together by sutures. I apprehend that the principal obstacle to the union of the pared margins of the flaps, when thus approximated, consists in the involuntary movements of the parts caused by muscular action; and that this is sometimes so vigorous as materially to interfere with bringing them together. That this muscular resistance is not merely hypothetical the opinions of many who have written on this subject will testify. Sir Phillip Crampton remarks:—

"Retraction of the edges of the fissure, effected by the muscles of the palate, has always been acknowledged."†

Pancoast observes, speaking of the incisions requisite:—

"To divide the insertion of the palate muscles, so as to prevent their straining the sutured edges of the palate asunder."‡

Warren observes, alluding to the flaps:—

"They could be partially drawn out, though with great resistance."§

Another authority states:—

"From the involuntary movement of the flaps there is much risk of failure."

* To these may be added Mr. Gay's case, to be presently related.

† Dublin Journal of Medicine, vol. xxii. p. 134.

‡ American Journal of Medical Science, vol. xxvii. p. 71.

§ New England Quarterly Journal of Medicine and Surgery. 1843.

A question naturally arises—What muscles are instrumental in the production of this resistance to the approximation of the flaps?

Referring to a recent work upon *Operative Surgery*,* we find the *circumflexus-palati* has a greater influence assigned to it, in this respect, than the other muscles of the soft palate. Judging from the fact that the greater part of this muscle has a fixed bony insertion, and from the extremely small effect produced upon the corresponding flap by pulling at the fleshy belly of the muscle in dissected specimens of cleft palate, we should draw a different conclusion; especially when we observe the opposite condition of the *levator-palati* and *palato-pharyngeus*, and the altogether different effect produced upon the flaps by the slightest traction in the axis of the first of these muscles in similar specimens. The *levator-palati*, *palato-pharyngeus*, and *palato-glossus*, appear to me to be the muscles concerned in producing the tension alluded to, but more especially the former; and, in proof of this action, if any further evidence is wanting, I may advert to the negative evidence afforded by the complete relaxation of the flaps on the division of these muscles, and the removal of all resistance by the incisions requisite for this purpose, which are of such a character as to afford no other reason for this than the division of the muscles themselves.

Without attributing all the tension in the flaps, caused by bringing them together, to muscular action, because the small size of the flaps in some instances, and the consequent wideness of the cleft, must operate materially in producing it, in particular cases, where it is very great, yet I think it must be evident that the muscular action of the parts is detrimental to their union; and that, if this can be removed without placing the patient in a more unfavourable position than he occupied before, as regards the operation, it is desirable to do so. That the patient is in a more advantageous state for the healthy union of the fissure, I will endeavour to show presently. There can be no great objection to the division of the *tensor palati*, if it be proved that the parts will not unite readily without, and in that case it should be divided at the

* *Operative Surgery*, by Frederic C. Skey, F.R.S.

place most convenient to restrain its action.

Now the longitudinal incision through the palate, as recommended by Dieffenbach, is an application of the same kind of treatment that is practised upon the perineum, and other parts, in cases in which the tension is occasioned, not by the muscles acting on the incised parts, so much as by a stretching of them in certain movements of the body, or resulting from a loss of substance in the gap to be filled up by simple approximation of its edges.

In the case of cleft palate, it appears to me that the conditions are not similar, and that the incisions, were they necessary for this purpose, irrespective of the action of the levator palati, would be advantageously made on the upper surface of the velum rather than the lower, on account of the elevation of the flaps, accompanying the very high arch of the palate in such cases.

It has been urged by some, who still remain attached to the old method, that the various incisions suggested by Dieffenbach, Pancoast, and others, for relieving the tension of the parts, would include considerable portions of the muscles in question: but it should be remarked, that these incisions are not calculated to effect this purpose, from their being made for the most part in the direction of the muscular fibres, instead of across them: the only muscle that would be likely to be divided is the tensor palati, and the tendinous expansion of that muscle being situated near the upper surface of the velum, would require the incision to extend through the soft palate, and pass into the nose in order to ensure its division.

Among the disadvantages of this incision, as compared with the other, did it answer the purpose intended, may be enumerated the following:—

1. The larger size of the wounds.
2. The severity of the pain occasioned by the greater sensibility of the parts incised, and consequent excess of inflammation, frequently of an unhealthy character, ensuing.
3. The kind of wound, which is almost entirely glandular, and is more likely to be the seat of unhealthy inflammation, when there is a tendency to it, than a muscular wound.
4. The irritation of the wounds by the necessary amount of nourishment.

5. Their near proximity to the cleft, where it is desirable that the healthy process should go on quietly.

6. The difficulty of swallowing, from the greater soreness of the parts, as ascertained from patients themselves.

To these may be added the want of success in the old operation generally; of which, numerous instances, were it necessary, might be adduced.

On the other hand, in Fergusson's operation, if I am not greatly mistaken, the majority of these objections are absent. The patient can take nourishment with comparative ease; there is less pain both during and after the operation; the wounds are at a distance from the cleft, and consequently they do not interfere with the union of the parts. The incisions themselves are not so much in the way of irritation, so that the patient can take nutrient fluids, from the first, without inconvenience: besides these, as a result of the different principle of the operation, the flaps are rendered loose and flaccid, being for the time almost completely paralysed. The operation is in no respect more difficult, and is generally attended with less bleeding.

Since Mr. Fergusson first made known his operation to the profession, in a paper read before the Medico-Chirurgical Society in 1844, others have had opportunities of practising it; and though the views held out in that elaborate and valuable paper have been very tardily received, yet, unlike many new operative proceedings, it has met with almost invariable success in the hands of all who have put it in practice. Mr. Avery has informed me of seven cases in which he has operated for fissure implicating the hard palate, as well as simple fissure of the velum, all of which succeeded perfectly. A detailed account of three of these cases is contained in the *Lancet*, Sept. 21, 1850.

Of the 29 cases recorded by Messrs. Fergusson and Avery, 26 were successful. Some of these were very unfavourable, as the ordinary operation had already failed. Of the three failures, two were unfit cases for any operation; in one, Dr. Warren's plan of separating the tissues from the hard palate was tried; another (a case of Mr. Shaw), is stated to have been unfavourable for any operation: the failure of the third, Mr. Fergusson attributed to removing the sutures on the second day, the flaps

having separated during the subsequent night.

The fourth case in the paper alluded to is enough of itself, one would suppose, to place this operation on an equal footing, at least, with the older method: the patient had been three times operated upon by Mr. Tuson, of the Middlesex Hospital, but without success; yet, on being operated on by Prof. Fergusson, the union was perfect throughout, "with the exception of a small aperture in front, a little larger than might admit a probe."

There are some important points in the operation which may be here alluded to. Advantage will result from including a good portion of the soft parts in the sutures, in order that that amount of tightness necessary to keep the edges of the fissure in close contact, and preclude the intervention of mucus, may not produce strangulation of the parts. In tying the sutures by means of a loop of one end slipped down on the other, in consequence of the sudden and jerking manner in which it sometimes passes down, there is much difficulty in controlling the tightness to which it is pulled; hence, the more simple method is often preferable.

Sufficient substance should be pared off the margins of the fissure to expose as large a surface as convenient for union, and the slip removed from each flap should be taken off in one continuous piece, so that no part may escape; and, to effect this, the knife should be passed through from below, at about an eighth of an inch from the margin; and commencing at the base of the uvula, it should be carried up to an eighth of an inch in front of the angle of the cleft: then, without detaching it in front, the remaining part—viz., the side of the uvula, should be pared with great care; the same process should be repeated on the other side, after which, the two may be separated in one continuous piece by carrying the knife round in front, or each side may be detached separately.

The margins should be pared before any incisions to divide the muscles are made, or it should not be done till the bleeding from these is arrested, as the blood prevents a good view of the edges: this being a very important part of the operation.

It is advisable to commence tying the

sutures at the part approximated with most difficulty—viz., in front. An advantage of introducing both stitches from the under surface of the velum is, that they can be placed opposite each other with much greater precision; but, in carrying the sutures from one side to the other, the method used by Mr. Avery has an advantage, from its simplicity, and not requiring any knots: a single ligature is passed through one side, by means of a strong curved needle, with the eye near the point, and set in a handle; when the loop is visible in the cleft it is seized with long forceps; the needle is withdrawn, and the loop pulled out of the mouth; one end is now drawn through, leaving a single ligature through the flap: a finer thread is now passed through the opposite side, and in the same way is seized, and the needle withdrawn, leaving the loop: the end of the single and larger thread is then passed through the loop, which being withdrawn by pulling at its two ends, carries the single thread through the opposite side, and is ready for tying.

Since as favourable a condition for the union of the parts as possible is desirable, the pillars of the fauces, and especially the palato-pharyngeus, should be divided in all instances, as well as the levator palati.

Great care is required, in the majority of cases, to close the most anterior part of the cleft, especially when it extends into the hard palate. This will be best attained, after the soft parts have been freely separated from the bone at the angle of the cleft, by division of the upper part of each flap, from the posterior border of the hard palate, by means of sharp-pointed scissors curved on the flat, cutting into the nose. By this means part of the insertion of the tensor palati is cut away, which, together with the dissection of the tissues from the hard palate for some distance in front of the cleft, will produce considerable relaxation of the parts. When, owing to the wideness of the cleft, much tension is occasioned near the hard palate by bringing the sides together, a longitudinal incision might be made with advantage on the under surface of the velum, between the cleft and the alveolar border; but confined to the spot occupied by the tendinous expansion of the tensor palati.

In conclusion, I would remark that the vascularity of the soft palate is so

great that no apprehension need be entertained that the incisions which have been recommended will not heal rapidly, provided the health of the individual is not suffering from any other cause, and in such a case the operation should be deferred.

Since the foregoing paper was communicated to the Abernethian Society of St. Bartholomew's Hospital, four other cases have come under my observation, occurring in the practice of Mr. Gay, three of which are at the present time in the Royal Free Hospital.

CASE II.—Eliza Smith, aged 23, was admitted into the hospital Oct. 14 of the present year, having come from Ewell, near Dover. This patient had previously undergone an operation, and has been alluded to before.

On examination, a fissure was seen extending through the velum, and slightly implicating the hard palate. The halves of the palate were perfectly sound, nearly nine months having elapsed since the former operation was performed; and the tissues did not appear to have undergone much change by having been already operated upon. Her general health was good; and, in order that she might be in a favourable condition in this respect, the operation was performed at once. Accordingly, on the 16th, the weather being fine, Mr. Gay proceeded to operate in the presence of Messrs. Avery, Dempsey, Jackson, and Davenport.

The levator palati of each side was first divided, afterwards the posterior pillar of the fauces, and then, to a slight extent, the anterior pillar of one side. By section of these muscles the palatal movements were tolerably controlled, and the flaps were rendered loose. The edges of the cleft were now freely pared, and the soft parts detached from the under surface of the hard palate for about three or four lines forwards on each side. The edges were brought together by four sutures, the parts about the anterior suture being rather tense. After division of the levator palati some relaxation of the parts took place, but it was most considerable after the palato-pharyngei were divided. A little bleeding occurred, but was readily arrested by iced water. The operation occupied nearly three-quarters of an hour. The patient was after-

wards kept in bed and not allowed to speak. Nourishing fluids were given in small quantities and often, the fluid being carried to the back part of the pharynx in a spoon.

On the 19th slight suppuration had commenced; the edges of the flaps had remained in close contact, except in front of the anterior stitch; she complained of smarting pain and the disagreeable odour arising from the palate; there was no undue inflammation of the parts or constitutional disturbance.

21st.—Posterior suture removed; parts keep in good apposition.

22d.—Next suture removed.

23d.—The two remaining sutures taken out.

24th.—She has commenced eating solid food; a small quantity of matter exudes from the unclosed part, which is immediately behind the hard palate, and about the size of a quill; the rest of the palate remains united.

31st.—The part which was found not to have united is gradually closing without any application.

Nov. 20th.—The opening will but admit a probe, and is healing up.

CASE III.—Mary Bryan, æt. 21 years. This patient originally had a fissure of both hard and soft palate, extending through the alveolar margin, and complicated with hare-lip and considerable projection forwards of that portion of the upper jaw bearing the front teeth. Mr. Gay operated on the hare lip several months ago; and the patient was admitted, Oct. 8th, for the purpose of attempting to remedy the defect in the bony structures, preparatory to uniting the cleft in the soft palate. It was observed that, as usual, the fissure in the hard palate was to the left of the mesial line, leaving the septum nasi attached inferiorly to the right margin of the cleft. The projecting portions of alveolar border were broken down, after being partially sawn through from the inside, and the teeth brought into contact by these means were carefully bound together with silver wire. Three weeks afterwards the septum nasi was severed above, by means of small angular bone forceps, and then pulled down across the fissure by a curved hook, so as to come in contact with the opposite side, to which it was united by strong suture. The case is going on well, and the soft palate, the two halves

of which come together easily at their posterior part during deglutition, will be operated upon as soon as the union of the other parts has become quite firm.

The condition of the fissure in this case, and the relation it held to the septum nasi, is the same as in the dissection of the child's palate before alluded to; and probably it will be found in similar cases that the situation of the septum nasi is such, that a sufficiency of substance may be found here to close the fissure in its neighbourhood. The fact of complete fissure of the hard palato never occurring in the mesial line, unless there is double hare-lip and fissure of the alveolar arch, is remarkable; and it is attributed by M. Petrequin* to the circumstance, that originally the intermaxillary bone intervenes between the two halves of the upper jaw, and causes the fissure anterior to the palato bones to pass to either side—most frequently to the left.

CASE IV.—Wm. Wortley, æt. 23 years, of light complexion, dark hair, by trade a tailor, was admitted into the Royal Free Hospital Nov. 17th, under the care of Mr. Gay. He was suffering from gonorrhœa, but in other respects appeared in good health. He entered the hospital with the view of having "something done for his throat," which was the source of inconvenience to him, and on examination was found to be fissured as far forwards as to involve $\frac{1}{8}$ th of an inch of the hard palate; the anterior diameter of the fissure close to the posterior border of the hard palate was $\frac{3}{8}$ th of an inch, and the posterior diameter between the halves of the uvula was 1 inch and $\frac{3}{8}$ th; the whole length of the fissure being 1 inch and $\frac{5}{8}$ th: these measurements were ascertained by means of a bent probe. On irritating the flaps they were suddenly drawn upwards and apart; during irritation of the posterior wall of the pharynx the sides were approximated, but met together only at the posterior part.

His speech was better than that of the majority of persons affected with this deformity, and he stated that by drinking slowly he rarely found any of the fluid pass into his nose. There existed an additional complication of

hare-lip on the left side, with flattening and depression of the left ala nasi; the hare-lip had been united twelve years, but the altered position of the ala of the nose had not been restored. On examining the upper jaw, an irregularity was observed corresponding to the interval between the left lateral incisor and the canine teeth. He was ordered sulphate of zinc injection, and two of the aperient pills of the hospital.

Nov. 18th, at 2 P.M., Mr. Gay operated, Messrs. Wakley, Avery, Walton, and others being present. The division of the muscles was made as before described; but the muscular resistance of the flaps being great, the incisions above the soft palate were made more freely than usual, so that the flaps hung down and nearly touched; considerable bleeding followed this, but it was controlled by means of iced water. The tissues were then separated from the palate bones around the front of the cleft, and the margins of the flaps were pared; six sutures were applied, and in tying them the knots were placed on alternate sides of the fissure. The operation was extended over a period of an hour and three-quarters, and the patient submitted to it with remarkable determination.

10 P.M.—Skin hot, pulse 88. Complaints of thirst and soreness about the throat; the slightest movement of any muscles of the pharynx appears to give him great pain. A pad of lint was placed underneath the lower jaw, and held by means of a few turns of a bandage round the head, to assist in keeping the parts at rest, as employed by Pancoast. Being unable to swallow, an enema of gruel with two drachms of laudanum was given.

19th.—Slept part of the night. Skin cool and moist; tongue slightly furred; pulse 88, small; finds advantage from the bandage. A clot has formed over the wound. Being still unable to swallow without great pain, he was ordered beef-tea injections, containing a glass of wine, and to take a little gruel.

10 P.M.—Skin hot; pulse 90, full and soft; head hot; sutured edges slightly grey at posterior part. He complains of soreness of throat and inability to swallow. A drachm of laudanum was given by the bowel.

20th.—Passed a tolerable night. Tongue moist, and coated with a white

* *Traité d'anatomie medico-chirurgicale et pathologique.*

fur; pulse 92, small; breath foetid; bandage removed.

21st.—The posterior suture has given way, leaving the uvula ununited: there is much less soreness of throat, and he can swallow without much trouble; there is slight suppuration apparent about the ligatures, without much inflammation, and the halves of the uvula have an ash-grey colour, but do not appear to be ulcerating. To take strong soup and rice milk.

22nd.—Was allowed to sit up a little yesterday. Countenance pale; pulse soft; skin cool; bowels open; a small proportion, between the second and third sutures from the front of the velum, is sloughing. Complains of pain in his left ear. The parts to be lightly touched with lotion composed of Tinct. Myrrhæ ʒj., Dec. Cinchonæ ʒij. To take Acid. Sulph. Dil. ℥xv., Tinct. Cinch. ʒj., Decoet. Cinchonæ ʒj., three times a day, and good diet.

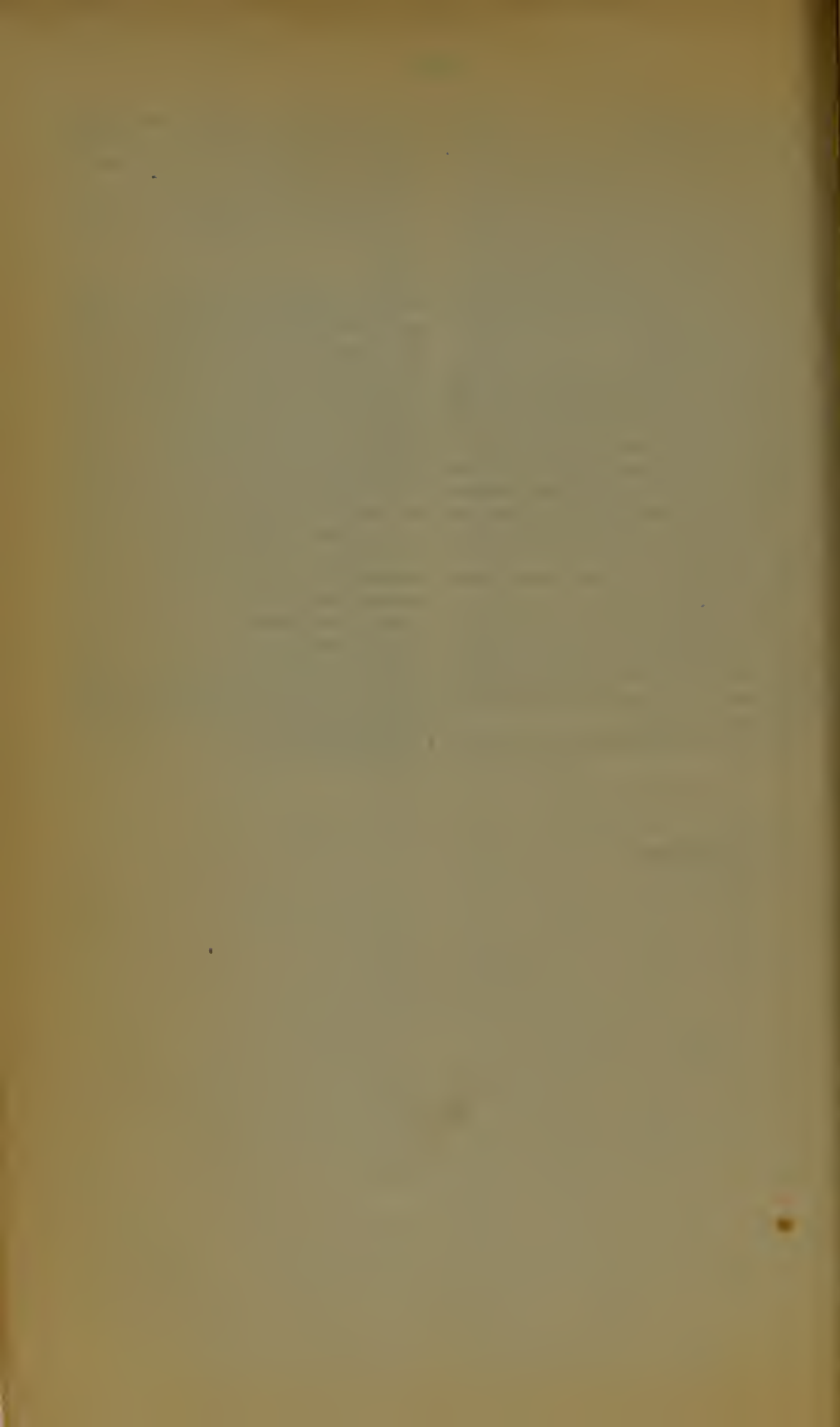
25th.—Ligatures removed; no ulceration; a considerable portion has united, but there is an oval opening towards the front which would admit a horse-bean. He can take food without difficulty.

29th.—All inflammation has sub-

sided. He can swallow easily; the edges of the opening are healthy, are covered by granulations, and afford evidence of a tendency to close it.

Mr. Gay has informed me of another case which has occurred in his private practice.

CASE V.—Miss R., aged 24, with a congenital fissure of the soft palate, came from Manchester to consult Mr. Gay, and finally arranged to have the operation performed. The cleft did not extend into the hard palate; the halves of the uvula came together during deglutition. The operation was performed Oct. 5th, and the levator palati, palato-pharyngeus, and palato-glossus of each side were divided. Four sutures were employed, and the cleft was by these means brought fairly together. The inflammation was at first rather considerable, but did not impede the union of the parts. In this case, as commonly happens, all the fissure united except a small portion next the hard palate, where the flaps do not appear to be adequately relieved by the muscular section: this ordinarily closes afterwards by granulations, and in this instance has gradually filled up.





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